

**NOTOSPHINDUS SLATERI, A NEW GENUS AND  
SPECIES OF SPHINDIDAE  
(COLEOPTERA: CUCUJOIDEA) FROM AUSTRALIA**

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*Abstract.* — *Notosphindus*, a new genus of Sphindidae (Coleoptera: Cucujoidea) from Australia, is described based on a single new species, *N. slateri*. A diagnosis for *Notosphindus* is provided using those characters believed to be of phylogenetic importance at the generic level. Dorsal and ventral habitus illustrations and morphological illustrations are provided. Several character transformations in the family Sphindidae are discussed.

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The coleopteran family Sphindidae with 52 described species is relatively small, but is represented in every major biogeographic region (see McHugh, 1991). Species of the genus *Aspidiphorus* have been reported from numerous old world localities including Tasmania (Champion, 1924; Scott, 1926) and Queensland (Scott, 1926). These records were apparently based on undescribed material, some of which may have been at The Natural History Museum (London). Curiously, these seem to be the only Australian records for the family to date. Subsequent faunal works for the region, including Britton (1979), do not include any species of Sphindidae in summaries of Australian Coleoptera.

In an hypothesis of the phylogenetic relationships of the genera of Sphindidae, McHugh (1991) included an undescribed Australian genus. That analysis found that *Notosphindus*, described as new below, clearly belongs to the subfamily Sphindinae (*sensu* McHugh, 1991) that includes those genera with the following character states: mandibles flattened, galeae apically narrowed, and wings lacking an anal cell and lacking a branched first anal vein. *Notosphindus* may be the sister group of the clade *Carinisphindus* + *Sphindus* or of the clade ((*Carinisphindus* + *Sphindus*) + (*Aspidiphorus* + *Eurysphindus* + *Genisphindus*)). *Notosphindus* possesses several character states intermediate between previously described forms, suggesting alternative interpretations of character transformation series in the Sphindidae.

Measurements given in the text are ranges with the arithmetic mean in parentheses. The units of measure are millimeters. Insect collections are represented by acronyms in the text as follows: (ANIC) Australian National Insect Collection, Canberra; (BMNH) The Natural History Museum, London; (CNC) Canadian National Collection, Ottawa; (CUIC) Cornell University Insect Collection, Ithaca; (FMNH) Field Museum of Natural History, Chicago; (MCZ) Museum of Comparative Zoology, Harvard University, Cambridge; (USNM) Smithsonian Institution, Washington, D.C.

**Notosphindus**, new genus

TYPE SPECIES: *Notosphindus slateri* McHugh & Wheeler, designated here and described below.

**DIAGNOSIS:** *Notosphindus* bears a strong resemblance to *Sphindus* and *Carinisphindus*. It may be distinguished from both genera by three characters: (1) the pronotum of *Notosphindus* is abruptly depressed posteriorly and posterolaterally; (2) the mandible is tridentate in *Notosphindus* while in the other two genera only one well-developed tooth occurs; and (3) the pygidium is punctate over most of the dorsal surface as opposed to being impunctate in two large lateral patches that are raised and densely setose in *Carinisphindus* and *Sphindus*. In addition, *Notosphindus* differs from *Carinisphindus* in that the pronotum and scutellum of the former lack a median, dorsal, longitudinal carina; the lateral edge of the pronotum is crenulate in the former but smooth in the latter; the apex of the clypeus in the former is arcuate with a pair of weak lateral notches as opposed to being deeply emarginate and lacking lateral notches; and the antennal club of the former is three-segmented as opposed to two-segmented. *Notosphindus* differs from *Sphindus* in that the male metafemur has a posterior tooth, and the wing venation includes the first and fourth anal veins. The color pattern in the only known *Notosphindus* species is much more distinct than that in any known *Sphindus* species, but it is impossible to know whether this will serve as a good generic character.

If *Aspidiphorus* truly is represented in Australia it can be easily distinguished from *Notosphindus*. In *Aspidiphorus* the body form is oval and convex; the procoxal cavities are widely opened externally; the pronotal lateral edge is smooth; antennomere VIII is at least as long as wide; the hypomera are concave anteriorly; the pygidium has a median longitudinal groove. For *N. slateri* the body form is elongate, subparallel and more flattened; procoxal cavities are closed externally; pronotal lateral edge is crenulate; antennomere VIII is transverse; hypomera are not concave; and the pygidium lacks a median longitudinal groove.

**ETYMOLOGY:** From the Greek "notos" (south), and the existing genus name *Sphindus*, a name suggested by J. F. Lawrence in reference to the distribution of the only known species.

### ***Notosphindus slateri*, new species**

Figs. 1–15

**TYPE MATERIAL.** Holotype: [AUSTRALIA: Mt. Field, N.P.] male (ANIC) with following label data: "42.41S 146.40E Mt.Field N.P. Lake Dobson Rd. 710m TAS 31 Jan. 1980 Lawrence & Weir" "J.F. Lawrence Lot 80- 15 Lycopala sp." Paratypes: 34 males, 19 females (ANIC); 2 males, 2 females (BMNH); 2 males, 2 females, (CNC); 2 males, 2 females (CUIC); 2 males, 2 females (FMNH); 2 males, 2 females (MCZ); and 2 males, 2 females (USNM) all with same label data as holotype.

**DESCRIPTION:** Body narrowly oval, convex, head visible from above (Fig. 1). Length = 1.5–2.3 (1.88). Head, pronotum, scutellum and anterior half of elytron light reddish brown; elytron with dark gray to blackish transverse band extending in length from lateral edge to almost the medial edge and ranging in width from broad at the lateral edge (extending from the midpoint of the elytron to a point about two-thirds its length) to much narrower near the medial edge (Fig. 1); apical end of elytron reddish-brown; eyes black; venter, legs, antennal stem, and mouthparts light reddish brown; body shiny. Dorsal setation of very short, pale, sparse setae.



Fig. 1. *Notosphindus slateri*. Dorsal habitus of adult male.

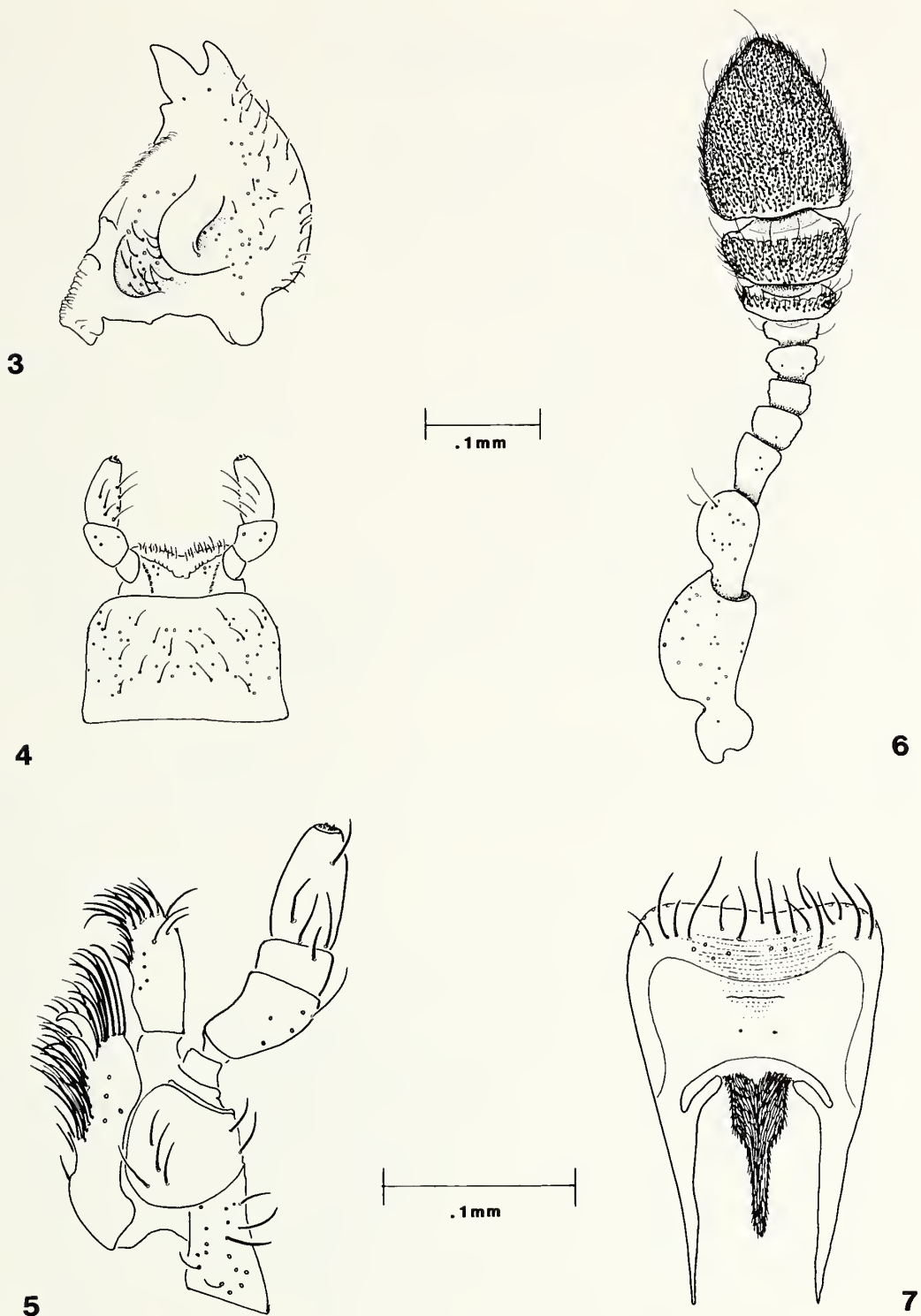
Head with a pair of strong dorsal antennal grooves extending from between antennal insertion and clypeus to beyond top of eyes and several other shorter, less distinct grooves (Fig. 1); medial region lacking grooves, but with sparse shallow punctures; weakly constricted postocularly; ventrally with 2 pairs of antennal pits, posterior pair poorly defined; frontoclypeal suture arcuate; gular sutures appearing externally as pair of short basal depressions; clypeus emarginate laterally, apically arcuate with pair of weak lateral notches; eye coarsely faceted.

Antenna 10-segmented, with robust and asymmetrical antennomeres I-II inflated



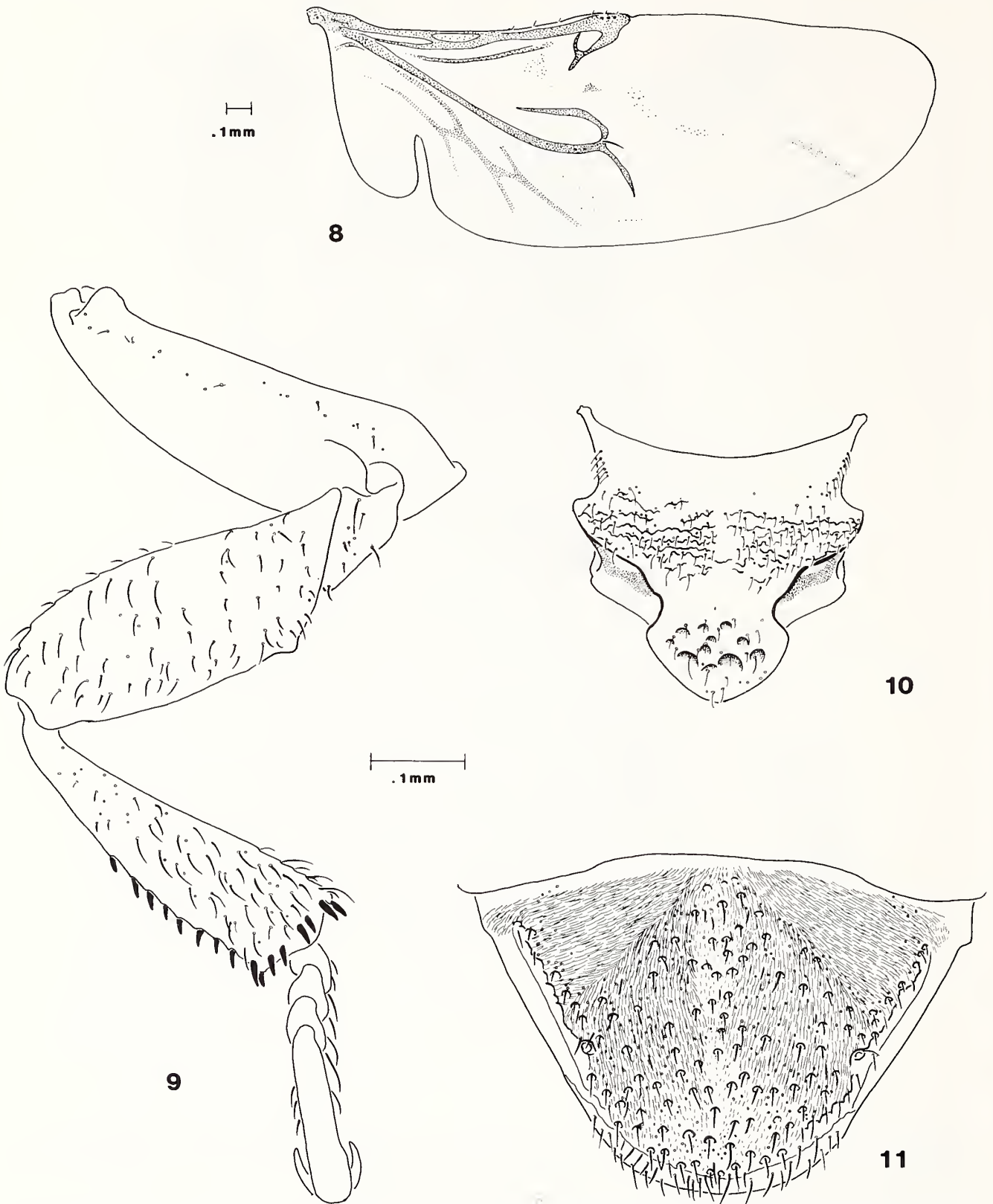
Fig. 2. *Notosphindus slateri*. Ventral habitus of adult male.

on anterior side, antennomere III about 2 times as long as wide, IV–VI submoniliform, VII wider and more transverse than IV–VI, VIII–X large, forming densely pubescent abrupt compact club; VIII wedge-shaped, IX–X symmetrical, X about 3 times length of IX, IX about 2 times length of VIII (Fig. 6). Labrum small, nearly completely concealed by clypeus; weakly bilobed at apex (Fig. 7). Mandible robust, tridentate; tooth II largest; tooth I somewhat deflexed; teeth flattened and all visible from dorsal view; tubercle with abrupt depression forming lateral margin (Fig. 3), prosthecal fringe of short curled setae. Maxilla with slender galea and lacinia, both densely setose at apex; lacinia with two stout spines; palpus four-segmented, basal segment smallest, apical segment longest and with sparse apical sensilla (Fig. 5). Labium with transverse mentum; bilobed ligula; apical segment of palpus largest; distal end with sparse sensilla (Fig. 4).



Figs. 3–7. *Notosphindus slateri*. 3. Right mandible, dorsal. 4. Labium, ventral. 5. Right maxilla, dorsal. 6. Right antenna, dorsal. 7. Labrum, ventral.

Pronotum length = 0.4–0.6 (0.5), width = 0.6–0.8 (0.76); slightly narrowed in front, rounded at sides, convex, flattened laterally with acute, weakly crenulate edge, anterior edge weakly emarginate medially (Fig. 1), basal margin arcuate, basal and lateral edges slightly upturned; dorsal surface with weak trace of pronotal lateral depressions, shallow punctures and very fine microsculpturing, abruptly depressed posteriorly and posterolaterally; procoxal cavity nearly closed exteriorly by posterior extension of hypomeron; prosternal process raised but deflexed at apex, punctate, slightly wider at apex than at midpoint (Fig. 2). Mesosternum short, punctate, weakly



Figs. 8–11. *Notosphindus slateri*. 8. Right wing, dorsal. 9. Right male metathoracic leg, anterior. 10. Scutellum, dorsal. 11. pygidium, dorsal.

deflexed near midpoint; mesosternal process flat, broad, weakly emarginate at apex; trochantin exposed. Metasternum inflated, densely punctate anteriorly and laterally, impunctate posteromedially.

Leg long. Coxa transverse. Femur moderately setose, male metafemur with posterior tooth near trochanter (Fig. 9). Tibia dilated apically and with weak groove to

receive tarsus, narrowed basally, moderately setose, with apical crown of stout spurs and several preapical spurs along anterior edge. Tarsi 5-5-5 female, 5-5-4 male. Tarsomeres simple, with apical segment about as long as others combined, tarsomeres with tuft of setae ventrally, claws simple.

Scutellum small, transverse, oval-chordate, with large weak median transverse depression formed by several irregular punctures which lack well-developed posterior margins (Fig. 10). Wing covered with minute setae, with posterior and posterolateral margins fringed with setae, with well-developed jugal lobe, media, cubitus, medio-cubital crossvein, costa, radius, three anal veins, and one anal cross vein (Fig. 8). Elytron length = 1.0–1.6 (1.25), width = 0.8–1.1 (0.95); elongate, covering abdomen, weakly rounded at side, tapered posteriorly, disk convex, with strong subhumeral depression and well-developed humeral callus, epipleuron narrow; dorsal surface with one scutellary and 10 long punctate striae interneurs; striae interspaces flat, with sparse irregular short setation.

Abdomen with 5 visible sternites; sternite I about 2–3 times length of other sternites, with large punctures; II–V with a basal row of depressions (Fig. 2), impunctate distally; sternites not in same plane giving shingled appearance. Pygidium covered with dense short setae and sparse longer setae emerging from punctures, fine setae sparser and setose punctures denser in median longitudinal band and distally (Fig. 11).

Male. Aedeagus turned on left side when retracted into abdomen. Parameres fused and nonarticulated, fused apex slightly swollen, but relatively narrow, positioned in apically concave median lobe (Fig. 12).

Female. Genitalia with a singly lobed coxite, broadly rounded at apex, sparsely covered with short setae (Fig. 15), stylus short preapical, with one long and one short seta (Fig. 14). Spermatheca with spermathecal gland at apex (Fig. 13).

ETYMOLOGY: A patronym for Professor James A. Slater whose diverse interests, scientific contributions, and scholarship have been a source of inspiration to the authors.

DISTRIBUTION: Known from southeast Australia in Victoria, and in Tasmania.

NATURAL HISTORY: As is the case for all species of Sphindidae, *N. slateri* is apparently myxomycophagous. Although records of sphindid species feeding on many different slime molds exist, representing a rather diverse group of host species (see McHugh, 1991), this is only the second species reported in association with a *Lycogala* species. *Sphindus dubius* has been repeatedly collected from *Lycogala* “species” (Jacquelin Du Val, 1863; Crowson, 1967); *Lycogala epidendrum* (Lawrence & Newton, 1980; Benick, 1952); and “*Lycogala miniata*” (LaCordaire, 1857; Kiesenwetter & Seidlitz, 1898; Schaufuss, 1916) which has since been synonymized with *L. epidendrum* (see Martin and Alexopoulos, 1969).

OTHER MATERIAL EXAMINED (all at ANIC): [Tasmania] 3 males, 2 females with data: “AUSTRALIA: Tasm.: Mt. Field NP Lake Dobson Rd. 240m 30.i-5.ii.1980 wet sclerophyll A. Newton, M. Thayer”; 1 male, 1 female with data: “Australia, Tas. Mt. Field N.P. Jan. 8–14, 1984 L. Massner, MT”; 1 male with data: “AUSTRALIA: Tasm.: Lyell Hwy. at Franklin R. 55kmESE Queenstown 400m 19–20.ii.1980 A. Newton, M. Thayer Nothofagus cunninghamii, etc. forest”; 1 female with data: “41.47 S 145.35 E 4km E Rosebery TAS 16 Jan– 1 Feb 1983 I.D. Naumann J.C. Cardale coll.”; 1 female with data: “Tasmania Balckburn S. A. Museum specimens”; and 1

male with data: "Australia, Tas. 10km S.Hellyer Riv. Jan.10, 1984 L.Masner, s.s. Old Nothofagus forest with Asplenium". [Victoria] 1 female with data: "AUSTRALIA: Vict.: Coranderrk Res., SE Healesville c240m 13.i.1980 Euc.-tree fern A.Newton, M.Thayer berlesed from leaf litter"; 2 males and 2 females with data: "37.43S 145.42E Cement Ck. 5km N of Warburton V 17 Jan. 1978 Lawrence & Weir J.F.Lawrence Lot 78-16 Lycogala sp."; and 1 male and 1 female with data: "AUSTRALIA VIC Cement Creek 5 km N of Warburton 17 Jan. 1978 Lawrence, Weir".

Many specimens in the type series appear to be teneral. They are slightly smaller, lack the typical coloration described above including the elytral markings and are uniformly yellowish-brown. Most of the specimens from the Australian mainland have more transparent elytra on which the dark markings seem to extend posteriorly to the elytral apex. The coloration pattern typical of the Tasmanian specimens and described above is also found in the mainland material as well as intermediate forms. Thus, we regard all these specimens as conspecific.

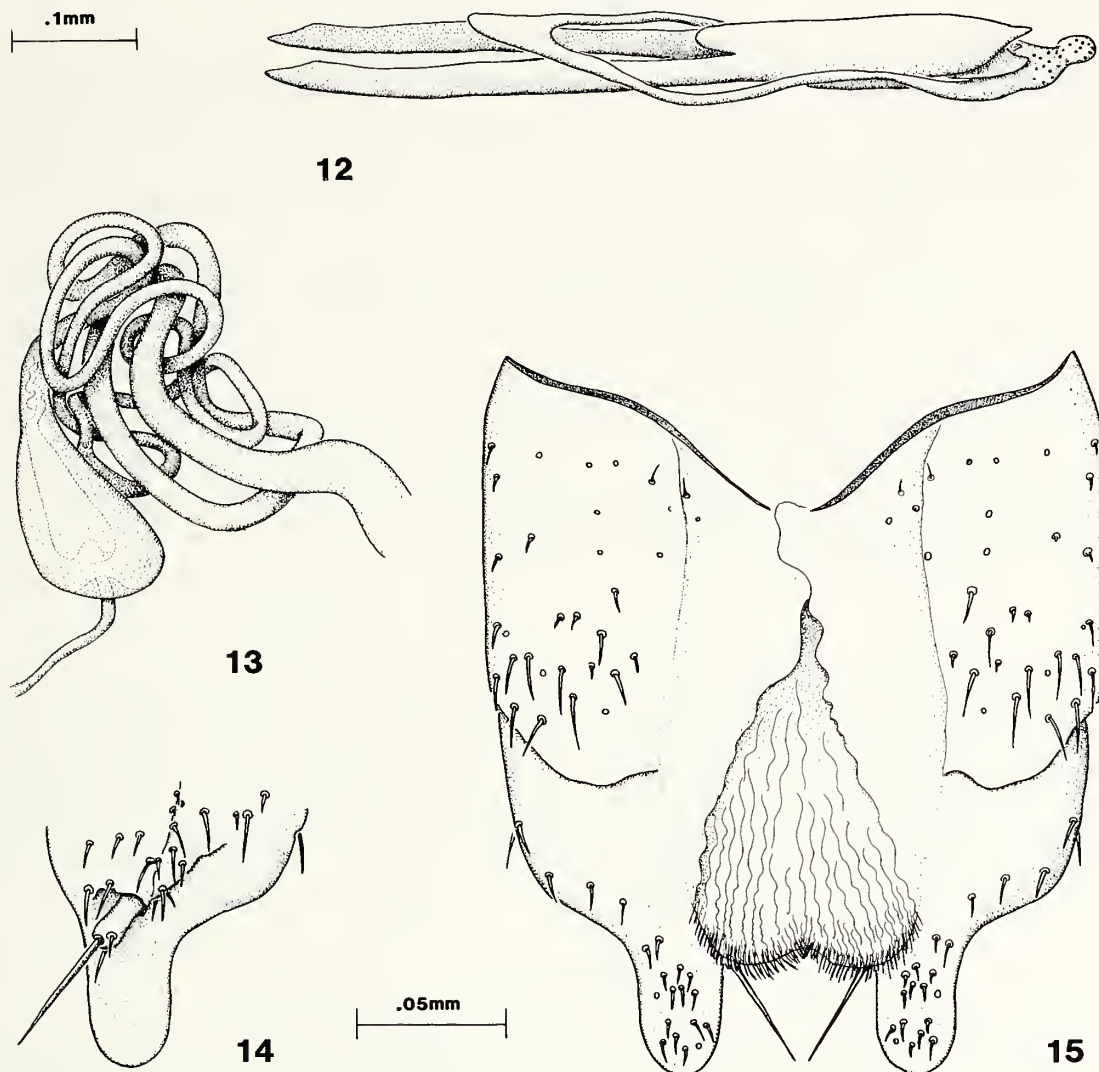
#### CHARACTER DISCUSSION

In light of McHugh's (1991) phylogenetic hypothesis, using *Ericmodes sylvaticus* (Protocucujidae) as the outgroup, *Notosphindus* is near the junction of the clades *Aspidiphorus* + *Eurysphindus* + *Genisphindus* and *Sphindus* + *Carinisphindus*. Because *Notosphindus* appears to be intermediate between previously known plesiomorphic and apomorphic extremes of several morphoclines within the family, it is of special phylogenetic interest. Thus, it may be useful to discuss the homology and polarity of these features.

The plesiomorphic condition for the mandible in Sphindidae involves a broad apex issuing three stout teeth in an overlapping arrangement as is seen in *Protosphindus* and *Odontosphindus*. The ventral tooth is completely hidden from dorsal view by the large middle tooth. In *Eurysphindus*, *Genisphindus*, *Aspidiphorus*, *Sphindus*, and *Carinisphindus* the apex of the mandible is flattened with all existing teeth visible dorsally (although a tooth is lost in some). In *Notosphindus* and *Sphindiphorus* all the teeth are visible from above but the first tooth is strongly deflexed. This suggests to us that the apical tooth on the flattened mandible of *Aspidiphorus*, *Eurysphindus*, and *Genisphindus* is homologous with the ventral tooth of *Ericmodes* (the outgroup), *Protosphindus* and *Odontosphindus*. In *Sphindus* and *Carinisphindus* only two teeth are present of which one is well developed, and it is unclear whether the apical-most tooth is homologous with the ventral or the middle tooth of the plesiomorphic condition. However, in *Notosphindus* the "ventral" tooth is smaller in size relative to the other two teeth, suggesting that perhaps this tooth is lost in the *Carinisphindus* + *Sphindus* clade.

Sphindidae seem to have gone through a series of reductions in wing venation. In the plesiomorphic condition (seen in *Protosphindus* and *Odontosphindus*), the wing venation includes the following features: three anal veins (1A apically branched), and two anal cross veins enclosing an anal cell. This plesiomorphic condition of the wing is illustrated by Burakowski and Ślipiński (1987: fig. 6) for *Protosphindus chilensis* and also illustrated by Crowson (1967: fig. 112) for *Sphindus grandis*, a species which appears to actually belong to *Odontosphindus* as suggested by Sen Gupta and Crowson (1977) (see McHugh, 1991). In *Aspidiphorus*, *Sphindus*, *Genisphindus*, and





Figs. 12–15. *Notosphindus slateri*. 12. Male genitalia, lateral. 13. Spermatheca. 14. Left coxite and stylus of female genitalia, ventral. 15. Female genitalia, dorsal.

*Eurysphindus* only one well developed anal vein remains that, judging from its position and form, is homologous with 2A in the outgroup. In *Notosphindus* (Fig. 8) and *Carinisphindus* (see McHugh, 1990: fig. 17) the venation is more complete (plesiomorphic), however, one branch of the first anal vein is absent.

The pygidium is another source of characters of phylogenetic importance for the family. In the plesiomorphic condition, the pygidium is impunctate and dorsobasally covered with short dense setae, and dorsomedially and distally covered with longer and sparser setae. *Notosphindus* has punctures at the base of the longer setae. These punctures are most dense in a median longitudinal strip which also lacks the short dense setae (Fig. 11). In the areas just lateral to this median longitudinal strip the punctation is somewhat reduced. This condition may be an intermediate one between the grooved pygidium seen in *Sphindiphorus* (see Sen Gupta and Crowson, 1977: fig. 15) and the pygidium of *Carinisphindus* and *Sphindus* on which a weakly depressed and punctate median longitudinal strip occurs (see McHugh, 1990: figs. 19, 25). Just lateral to this strip in *Sphindus* and *Carinisphindus* is a large impunctate patch on each side. These patches are covered with the dense short type of setae which are now confined to these patches alone and to a narrow basal area.

## CONCLUSIONS

Character states discovered in *Notosphindus* suggest new interpretations of several characters. Tests of these homology statements and polarity hypotheses, however, depend upon the analysis of additional characters. Unfortunately, the paucity of specimens of some sphindid groups prohibits disarticulation and examination of the male and female genitalia, the spermatheca, and the metendosternite. Although the sclerotized parts of the male genitalia are reduced, making it difficult to find useful phylogenetic characters, the female genitalia, spermatheca, and the metendosternite promise to be informative. The addition of information about other semaphoronts has been growing (e.g., Burakowski and Ślipiński, 1987), and it may soon be possible to include in an analysis data from larvae, pupae, eggs, etc. At the moment, however, only the adult stage is described for any species of *Sphindiphorus*, *Notosphindus*, *Carinisphindus*, *Genisphindus*, and *Eurysphindus*.

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